

United States Department of Agriculture,

DIVISION OF AGROSTOLOGY.

[Grass and Forage Plant Investigation.]

POA FENDLERIANA AND ITS ALLIES.

Poa fendleriana and its allies form an interesting and difficult group of species and are found chiefly in the southwestern part of the United States. The species are much confused in herbaria and have been very differently understood by the various botanists who have studied them. The first name published for any of the species was *Eragrostis fendleriana* Steudel, based on Fendler's No. 932 from New Mexico. Munro confused this as well as allied species with Hartweg's No. 2035, to which he gave the manuscript name *Sclerochloa californica* and much of the difficulty that later botanists have experienced has arisen from the fact that in his determinations of material he gave this name to such a great variety of plants, many of them differing widely in botanical characters. Thurber followed Munro in making the *Atropis californica* of Watson's Botany of California include very diverse forms. The *Poa californica* of Coulter's Manual of Rocky Mountain Botany and of which Munro is cited as the authority, is, according to both synonymy and range, even more puzzling than Thurber's *Atropis californica*. As stated in a recent publication of this Division (Circ. 9, Div. Agros., p. 3) Hartweg's No. 2035, to which Munro first gave his manuscript name *Sclerochloa californica*, is a very different

FIG. 1.—*Poa fendleriana*.

plant from the type of Steudel's *Eragrostis fendleriana*. It is a member of the "*tenuifolia*" group and agrees with the type of *Poa secunda* Presl, at least so far as the specimens in the National and Gray Herbaria are concerned. Dr. Vasey in "Illustrations of North American Grasses," Vol. 2, took up Steudel's specific name but still confused that species with Munro's *Sclerochloa californica* and figured a plant which seemingly does not belong to either and which is certainly not typical of *Poa fendleriana*.

Fendler's No. 932 seems to have been a mixture. There are two sheets under this name in the Gray Herbarium. The larger specimen on one of the sheets and a smaller plant in an envelope agree well with the specimen in the National Herbarium and with Steudel's description. A smaller undeveloped plant on this sheet is apparently the same as the larger specimen on the other sheet, which differs from what is here taken to be the type of *Poa fendleriana*, in having longer, narrower flowering glumes, which are rough-hispid on the back between the nerves, and relatively broader flat leaves. The panicle is also different. The smaller plant on this second sheet has a panicle much like that of *Poa brevipaniculata* S. & W., but the leaves and glumes are those of typical *Poa fendleriana*. A specimen in the Herbarium of Academy of Natural Sciences, Philadelphia, to which one of Fendler's labels is attached, is still different, belonging to an entirely different section of the genus.

The grasses of the *fendleriana* group are all conspicuous for their tufted habit of growth and are more or less completely dioecious. This latter character can not be satisfactorily studied in herbarium material, and careful field studies are necessary before all the members of the group can be properly understood.

SYNOPSIS OF THE SPECIES.

1. Ligules usually 5-7 mm. long, acute or acuminate, decurrent, those of the leaves of the sterile shoots conspicuous. *P. longiligula*.
1. Ligules much shorter, rounded or truncate at the apex; those of the leaves of the sterile shoots reduced to a narrow band or fringe, or obsolete. 2.
2. Panicle narrow and contracted. *P. longipedunculata*.
2. Panicle open. 3.
3. Panicle short, subpyramidal; lower internodes very short, exceeded by the sheaths; plants seldom reaching 3 dm. in height. 4.
3. Panicle longer, usually 8 cm. or more in length; internodes longer, seldom exceeded by the sheaths; plants usually 4-6 dm. in height. 5.
4. Flowering glumes oblong, leaves slender, rough. *P. scabriuscula*.
4. Flowering glumes broadly ovate, leaves smoother, broader and more rigid. *P. brevipaniculata*.
5. Spikelets rather acute, ovate, 4-7-flowered; leaf-blades hispid-pubescent on the upper surface. *P. fendleriana*.
5. Spikelets more obtuse, oblong to somewhat ovate, 5-9-flowered; leaf-blades rough-hispid above, but not pubescent. *P. eatoni*.

POA LONGILIGULA Scribner & Williams, Circ. 9, Div. Agros., p. 3 (Feb. 24, 1899).

This is one of the most clearly defined species of the *fendleriana* group, at once distinguished by its larger proportions, rough leaves, and long, decurrent ligules, well developed on leaves of both culm and sterile shoots.

Specimens have been examined as follows:

South Dakota: Black Hills (Rydberg 1144).

Wyoming: Evanston (Nelson 2991); Slough Creek, Yellowstone Park (Tweedy, 631).

Colorado: Navajo Canyon (Eastwood 10½); "Colorado Ter." (Thomas).

Utah: Silver Reef (Jones 5176, 5149, type); Echo (Jones); Springdale (Jones 5249); Santa Clara Valley (Jones 5139); Copper Mine, 18 miles west of St. George (Jones 5006); "S. Utah" (A. L. Siler 85).

New Mexico: Fort Wingate (Dr. W. Matthews 61).

Arizona: Pagumpa (Jones 5089); Congress (Orcutt 2534); Red Creek (Palmer 474½); Peach Spring (Lemmon 3172); Kingman (Orcutt 2474); Oak Creek (Lemmon 3155); Fort Mohave (Lemmon 3170).

California: Lemmon 18, without locality; San Francisco (Bolander 2286); Sierra County (Lemmon).

Nevada: West Humboldt Mountains (Watson 1312); Mica Spring (Jones 5057); Virginia City (Bloomer 2266); "Nevada" (Wheeler 1872).

Oregon: Steins Mountains, opposite Devine Ranch (Leiberg 2480).

POA LONGILIGULA WYOMINGENSIS var. nov.

Leaves more slender than in the species, usually strongly convolute, and the ligules less conspicuous; culm less leafy; panicle more contracted.

Type specimen No. 4799a, Aven Nelson, "In draws, Tipton, Sweetwater County, Wyoming, June 17, 1898."

Specimens have been received from the following localities, all in the southwestern part of Wyoming:

Leroy (Nelson 4589); Point of Rocks (Nelson 4758); Evanston (Nelson 4526 4527, 4562a and b); Tipton (Nelson 4799, 4799a, type).

Occurs in dry soil of broken prairies and on hillsides at an altitude of about 2250 meters. It approaches *P. longipedunculata* in habit of growth, but is readily distinguished by the character of the leaves, ligules, and glumes.

POA LONGIPEDUNCULATA Scribn., Bull. 11, Div. Agros. 54 (July 20, 1898), *Poa andina* var. *spicata* Vasey, Bot., Wheeler Exped. 290 (1878), not *P. spicata* Linn.

The original description of *P. longipedunculata* was drawn from a specimen with short leaves, much contracted panicle, and glumes nearly or quite smooth between the nerves, but does not seem specifically distinct from Vasey's plant, which has longer leaves, somewhat looser panicle, and glumes minutely hispid on the back. However, Vasey's name is preoccupied and the species must bear the name above given. The species is abundantly distinct from *Poa fendleriana* in its more densely caespitose habit of growth, generally smoother leaves and culms, narrow, contracted panicle, and smaller spikelets and flowers.

Specimens of this species have been examined from the following localities:

Wyoming: Sheep Mountain (Nelson 3292, type of *Poa longipedunculata*; Williams 2296); Quarry Canyon (Nelson 3180); Pole Creek (Elias Nelson 3194).

Colorado: Silver Plume (Shear 666; Rydberg 2418); Grays Peak (Shear 685; Letterman 49; Patterson 5); Graymont (Rydberg 2444; Letterman 64, 65); Stove Prairie (Osterhout 16); Lake Ranch (French); Bear

Creek Divide (Tracy, Earle and Baker 4263); Beaver Creek (Pammel); Marshall Pass (Shear 931); Manitou (Shear 765); "Colorado" (Wolfe 1135, 1136, 1137).

New Mexico: Santa Fe Canyon (Heller 3685).

POA LONGIPEDUNCULATA VIRIDESCENS var. nov.

Differs from the species in its greener color, generally longer, softer leaves, less contracted, often interrupted panicle, the more delicate texture of the glumes and the usually more conspicuous intermediate nerves of the flowering glumes.

Type specimen No. 2302, Thomas A. Williams; open places, dry mountain sides, Sheep Mountain, Wyoming, July 2, 1897. Altitude 2,400 meters.

Specimens have been examined as follows:

Wyoming: Sheep Mountain (Williams 2302, 2302a, 2276; Nelson 3304).

New Mexico: Barranca (Heller 3588); Santa Fe (Heller 3611); Santa Magdalena Mountains (Vasey).

The general aspect of this variety is quite different from the species and a study of a more extended series of specimens will possibly prove it to be deserving of specific rank.

POA SCABRIUSCULA sp. nov.

A pale green, closely caespitose perennial, $2\frac{1}{2}$ -3 dm. high, with slender, lax leaves, abundantly produced from intravaginal shoots and rather closely flowered subpyramidal panicles 5-7 cm. long by $2\frac{3}{4}$ cm. broad. Culm erect, striate, smooth except for a short distance immediately below the panicle; lower internodes short, usually exceeded by the sheaths, upper one much exserted. Leaf-blades flat or convolute, those of the sterile shoots 8-12 cm. long by $1\frac{1}{3}$ mm. wide, those of the culm short, the upper one seldom over 1 cm. long, often reduced to a mucro; leaf-blades all striate, more or less roughened throughout; ligule obtuse, about $1\frac{1}{2}$ mm. long; sheaths striate, rough, the lower ones persistent. Panicle erect, the branches scabrous, seldom exceeding 3 cm. in length. Spikelets compressed, usually 4-flowered, 5-7 mm. long, rachilla pubescent; empty glumes somewhat unequal, lanceolate, acute or subacuminate, smooth or very sparsely rough-hispid on the keels, shining, hyaline with green keel and nerves, lower 1-, upper 3-nerved, about 3 mm. long. Flowering glumes oblong, obtuse, keeled, smooth with keel and marginal nerves pubescent below and sparsely hispid above, intermediate nerves subobsolete, pale green or purplish with hyaline margins, about $3\frac{1}{2}$ mm. long; palea much shorter than the flowering glume, hyaline with green ciliate-hispid keels, apex bidentate.

Type specimen No. 136, L. F. Ward, mountains south of Glenwood, Utah, May 29, 1895. Altitude 2,550 meters. The species was also collected by J. Wolf (No. 184) in 1875 in South Park, Colorado.

The species is in some respects intermediate between *Poa fendleriana* (Steud.) Vasey and *P. brevipaniculata* Scribn. & Williams, but it is easily distinguished from the former by its shorter panicle, smaller spikelets and flowers, oblong flowering glume and rougher leaves, and from the latter by the character of the spikelets, texture and shape of the flowering glumes, slender, lax, rough leaves and lack of rhizomes.

POA BREVIPANICULATA Scribn. & Williams, Circular 9, Div. Agros., p. 2 (Feb. 24, 1899).

Specimens referable to this species have been examined from the following localities:

Colorado: Table Rock (G. F. Breninger 554, type); Mt. Hesperus (Tracy, Earle and Baker 262); West Mancos Creek (Tracy, Earle and Baker 160); Bob Creek (Tracy, Earle and Baker 205); Cripple Creek (Tweedy 279).

The grass occurs in dry soil of meadows and on mountain sides at an altitude of from 2,300 to 3,500 m.

POA BREVIPANICULATA SUBPALLIDA var. nov. Differs from the species in its paler green color, slender, soft leaves, which are less often conduplicate, and usually more contracted panicles.

Type specimen Hall & Harbourn (674 in part), Rocky Mountains, Colorado, 1862. A specimen belonging to this variety and possibly of the same collection as the preceding is in the National Herbarium ticketed as *Poa alpina* var., Rocky Mountains, 1862, E. Hall.

POA FENDLERIANA (Steud.) Vasey, Ill., N. Am. Grasses 2. No. 74 (1893), in part. *Eragrostis fendleriana* Steud., Gram., 278 (1855). *Atropis californica* Thurber, Wats. Bot. Calif. 2; 309, in part. *Poa andina* Vasey, Bot. Wheeler Exped. 289, not of Nuttall nor of Linn. *Poa californica*, in part, Coulter, Man. Rocky Mountain, Bot., 420 (1885). (Fig. 1.)

An erect, caespitose perennial, 3½–6 dm. high, with rather pale upright leaves, abundantly produced from intravaginal shoots and open, erect or somewhat flexuous, usually purplish panicle 5–10 cm. long. Culm striate, scabrous immediately below the panicle and nodes; internodes usually equaling or exceeding the sheaths. Leaf-blades flat or more often convolute, scabrous below, hispid-pubescent above, mucronate-pointed, those of the sterile shoots 1–2 dm. long, by about 1½ mm. broad, those of the cauline leaves much shorter, the upper one often reduced to a mucro; ligule short, rounded or truncate, reduced to a narrow band or fringe on the leaves of the sterile shoots; sheaths striate, scabrous, the lower ones membranous and persistent. Panicle branches spreading in anthesis, ascending in fruit, scabrous, the longer lower ones seldom more than 3 cm. long, flower-bearing above the middle. Spikelet compressed, ovate to ovate-lanceolate, rather acute, 4–7 (rarely more) flowered, 7–8 mm. long, 3–3½ mm. broad; empty glumes unequal, smooth, the lower 1-nerved, lanceolate, acute or subacuminate, the upper 3-nerved, ovate to ovate-lanceolate, acute, about 4 mm long; flowering glumes keeled, oblong-elliptical to oblong-ovate, obtuse, pubescent below on keel and marginal nerves, smooth between the nerves, intermediate nerves obsolete, about 5 mm. long; palea much shorter than the flowering glumes, sharply bidentate, sparsely hispid-ciliate on the keels; rachilla more or less hispid-pubescent.

Colorado: Trinidad (Crandall 15); Upper La Plata (Tracy, Earle and Baker 4257); Manitou (Heller, 3502),

New Mexico: Mangus Springs (Rusby 452); Silver City (Greene 438); Santa Magdalena Mountains (Vasey); Santa Fe (Heller 3530, 3561). "New Mexico" (Fendler 932, at least for the most part, type).

Arizona: Dos Cabezas (MacDougal 787; Emersley); Flagstaff (MacDougal 2); Ash Fork (Rusby); San Rita Mountains (Pringle); San Francisco Peak (Jones).

California: "Sta. Crus Sonora" (Parry).

Grows on dry hills and mesas at an altitude of from 1,350 to 2,750 m.

POA FENDLERIANA ARIZONICA var. nov.

Differs from the species in being strongly glaucous throughout, in having longer, rougher leaves, more unequal empty glumes, and in the firmer texture of the flowering glumes.

Type specimen collected at Yavapai Creek, June 1883, by Dr. H. H. Rusby. It was also collected by Dr. Rusby at Prescott, Arizona. A less glaucous plant, with smoother, flat leaves, collected by Dr. Rusby (No. 452) in the San Francisco Mountains, Arizona, may be the staminate form of the variety.

POA EATONI S. Watson, Bot. 40th Parallel, p. 386, 1871.

An erect, caespitose perennial 4-6 dm. high, from short rhizomes, with rough, more or less glaucous leaves and rather open, oblong, or somewhat ovate panicle, 7 or 8 cm. long. Culm smooth, more or less roughened immediately below the panicle, composed of two or three internodes, all but the lowest exceeding the sheath, the upper one long and much exerted. Leaf-blades flat or becoming conduplicate, scabrous below, and rough-hispid above; those of the basal leaves spreading, 1-2 dm. long, those of the cauline leaves seldom over 2 cm. long, the upper one often reduced to a mucro. Ligule short, with a rounded or truncate apex, that of the leaves of the sterile shoots reduced to a narrow band or fringe. Sheaths striate, the basal ones persistent. Panicle branches scabrous, erect or ascending, seldom more than 3 cm. long, flower-bearing along the upper half; spikelets compressed, oblong, rather obtuse, 5-9-flowered, 7-10 mm. long, about 3 mm. broad. Empty glumes subequal, acute, or subacuminate, the lower 1-, the upper imperfectly 3-nerved, hispid on the keels $\frac{1}{2}$ - $\frac{3}{4}$ the length of the adjacent flowering glume. Flowering glumes strongly keeled, the keels and lateral nerves thickly pubescent below, hispid above, smooth between the nerves, 4-5 mm. long, the intermediate nerves obsolete.

Very closely allied to *Poa fendleriana* but possibly distinct through its oblong, usually more numerous-flowered spikelets and shorter, broader, spreading leaves which, though rough, are not pubescent on the upper surface. It is possibly more strongly rhizomatous but this can only be determined by studies in the field. No specimens have been seen that can be referred to this species except those from the original collection by D. C. Eaton at Cottonwood Canyon, Wahsatch Mountains, Utah, where the plants grew in dry rocky soil at an altitude of 2,000 meters. Most of the material that has been placed by botanists under this species is true *Poa fendleriana*. Prof. J. Macoun has collected a plant in British Columbia (No. 58, Spencers Bridge, 1889; and 91, and 93, Valley of Fraser River, 1875), which has much the habit of *P. eatoni* to which it has been referred but it has the longer leaves (more or less hispid-pubescent above) and ovate to ovate-lanceolate spikelets of *P. fendleriana* and seems to be an intermediate form. It is not improbable that further study will result in the suppression of Watson's species.

NOTE.—In Circular 9, Div. Agrost., p. 3, the name *Poa planifolia* was applied to a species of the Rocky Mountain region, but since this combination has already been used by Dr. O. Kuntze (Revis. 3., pt. 3, sec. 2, p. 366, 1898) for a South American plant, a new name is necessary for our species. It may be called *Poa glaucifolia* Scribn. and Williams.

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